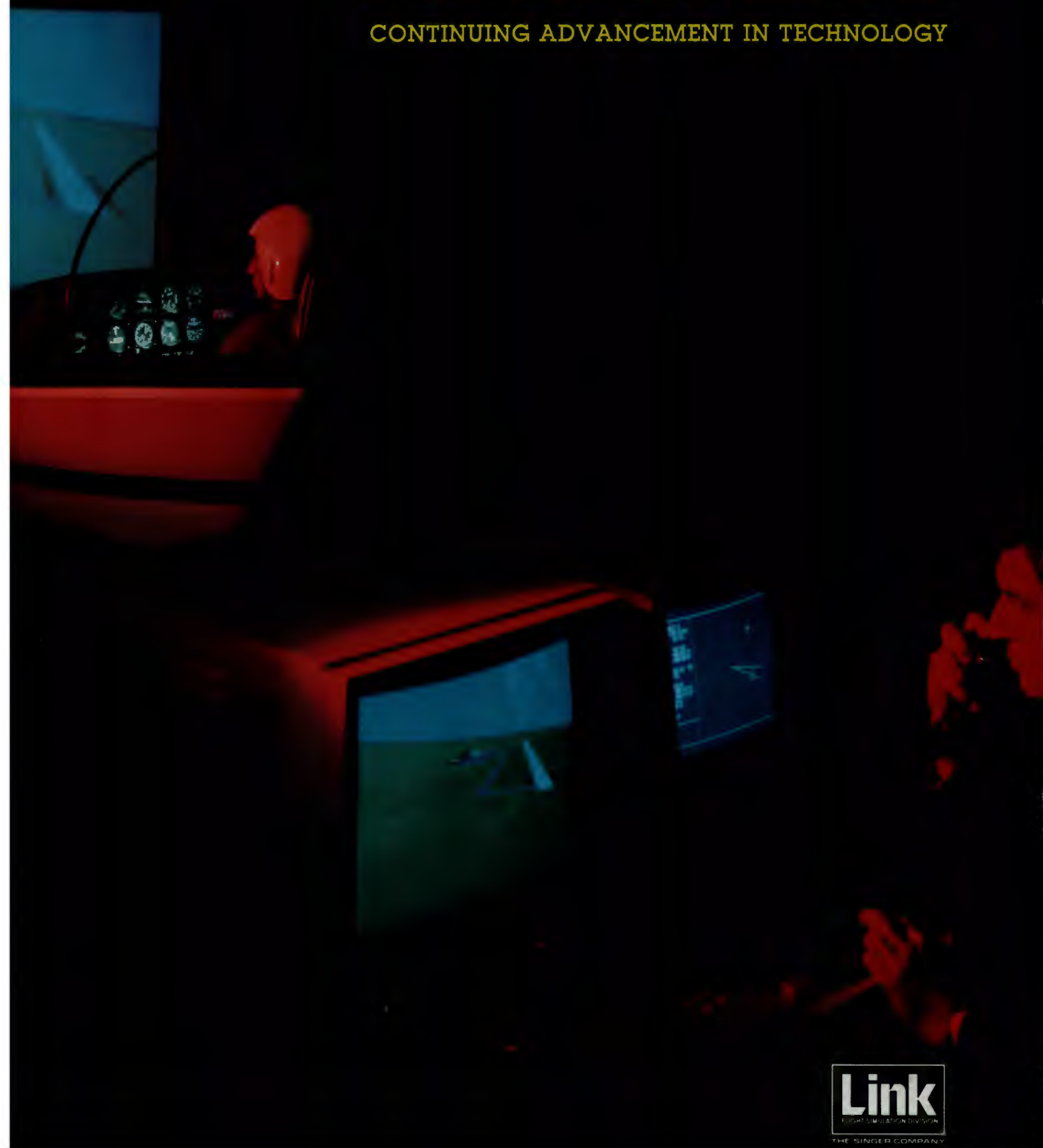


MICROFLITE

CONTINUING ADVANCEMENT IN TECHNOLOGY





MICROFLITE* — a new series of flight simulators designed to provide high fidelity, cost-effective training through Link's application of microprocessor-based design concepts.

MICROFLITE now makes it possible to achieve dynamic flight training in generic or exact cockpit configurations for primary military trainers, commuter aircraft, and helicopters. Four-degree-of-freedom motion and full daylight/night visual capability is achieved with the addition of low-cost modules.

MICROFLITE provides all visual, motion, and aircraft operational effects and performance in a real-time training environment. MICROFLITE duplicates accurate flight and systems performance and simulates weather, ground and wind effects. MICROFLITE can be used to educate the student in cockpit familiarization, emergency procedures, cross-country navigation, instrument flight and take-off and landing procedures.

MICROFLITE is the system for today — providing microprocessor-based technology for generic or configured aircraft training needs at a fraction of the cost of traditional systems.

*Trademark of The Singer Company



MICROFLITE redefines the architecture of flight training simulators with its cost-effective microprocessor modularity. Comprehensive training programs can now be applied to less complex aircraft for which only cockpit procedure training could be justified in the past.

These training capabilities are achieved through MICROFLITE's advanced modular design which includes a visual system providing an extended instructional range for civil aviation applications. The MICROFLITE visual module can include databases which bring tactical training within the range of modest military budgets.

MICROFLITE delivers productive instructional programs designed to teach and reinforce a trainee's skills in a variety of essential flight training requirements. Among them are:

FAMILIARIZATION

Cockpit orientation
Drills
Ground handling

PREFLIGHT

Cockpit inspection
Preflight checklist
Powerplant checks
Communication checks

TAKEOFFS

Instrument procedures
Powerplant failure procedures
Rejected takeoff procedures

INSTRUMENT PROCEDURES

Departure and climbout
Holding
Enroute navigation
ILS approach
Nonprecision approach
Missed approach

INFLIGHT MANEUVERS

Steep turns
Approach to stall
Flight characteristics
Powerplant failure

LANDING AND APPROACHES TO LANDING

Maneuvering to land with powerplant failure
Minimum circling approach
Rejected landings

NORMAL AND ABNORMAL PROCEDURES

Anti-icing and de-icing
Stall warning and avoidance systems
Instrument systems
Landing gear
Hydraulic systems
Fuel systems
Electrical systems
Secondary control systems
Overall aircraft management
Avionics

EMERGENCY PROCEDURES

Powerplant failure and maneuvers
Instrument failures
Emergency landing gear procedures
Fire detection and control
Decompression
Emergency descent
Aircraft systems failures and emergencies

WEAPONS DELIVERY PROCEDURES

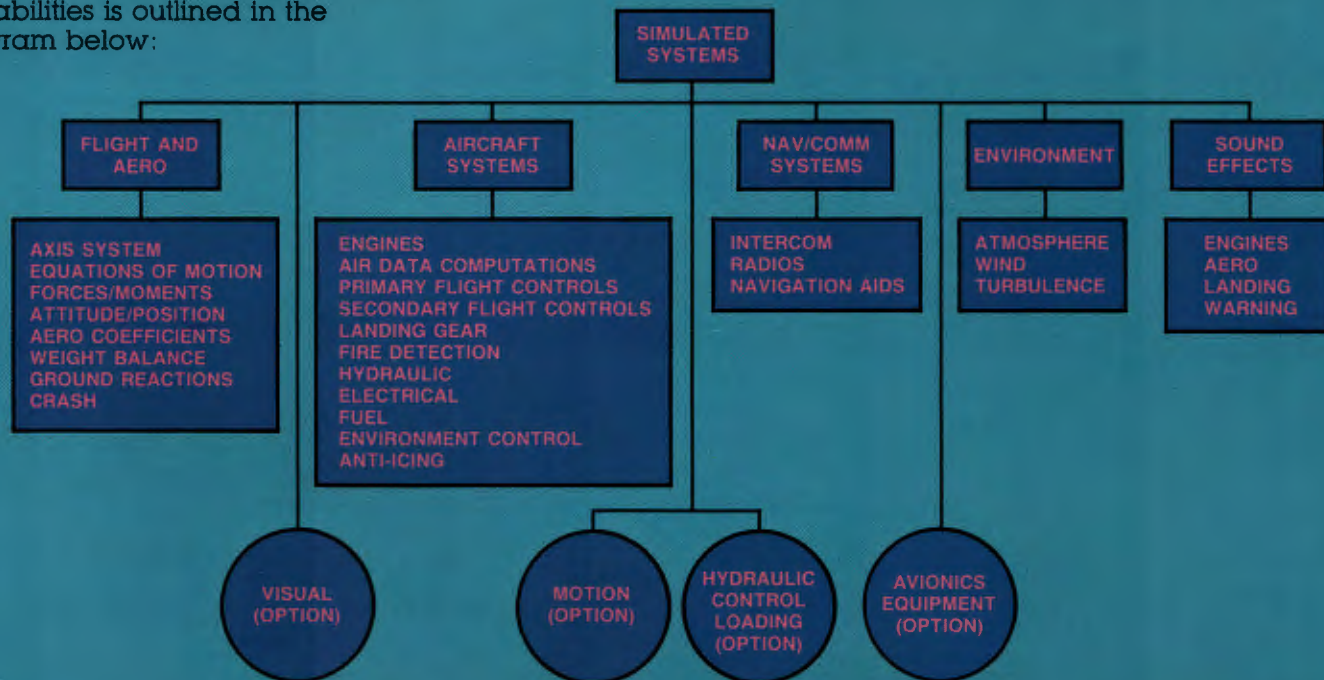
Selection
Maneuvering for weapons deployment
Release/firing

TRAINING CAPABILITIES



MICROFLITE provides a higher degree of simulated aircraft performance for training in normal or emergency operations through simulated controls, instruments, and sound effects. Flight performance is computed using equations which provide acceleration, velocity, and position results for all translational degrees of freedom of an aircraft.

The range of MICROFLITE simulation capabilities is outlined in the diagram below:



SIMULATION CAPABILITIES

SYSTEM MODULARITY

MICROFLITE permits development of a comprehensive training curriculum for a wide range of aircraft in a high-fidelity and cost-effective microprocessor-based modular package.

The package consists of two major modules — the cockpit and the instructor station. The standard simulator cockpit is representative of the aircraft cockpit with all controls, instruments, and furnishings, and includes the following:

- *The microprocessor-based computational system*
- *A high-speed electronic interface*
- *Mechanical control loading**
- *Sound effects*

The standard instructor station is equipped with a video display terminal (CRT and keyboard). The following control and monitoring capabilities are provided using this equipment:

- *Initial display and selection*
- *Aircraft configuration display and selection*
- *Environmental conditions display and selection*
- *Malfunction display and selection*
- *Training problem display and selection*
- *Current condition and instrument data monitoring*
- *Graphic displays for cross-country, departure, and approach navigation*

*Hydraulic control loading is available as an option

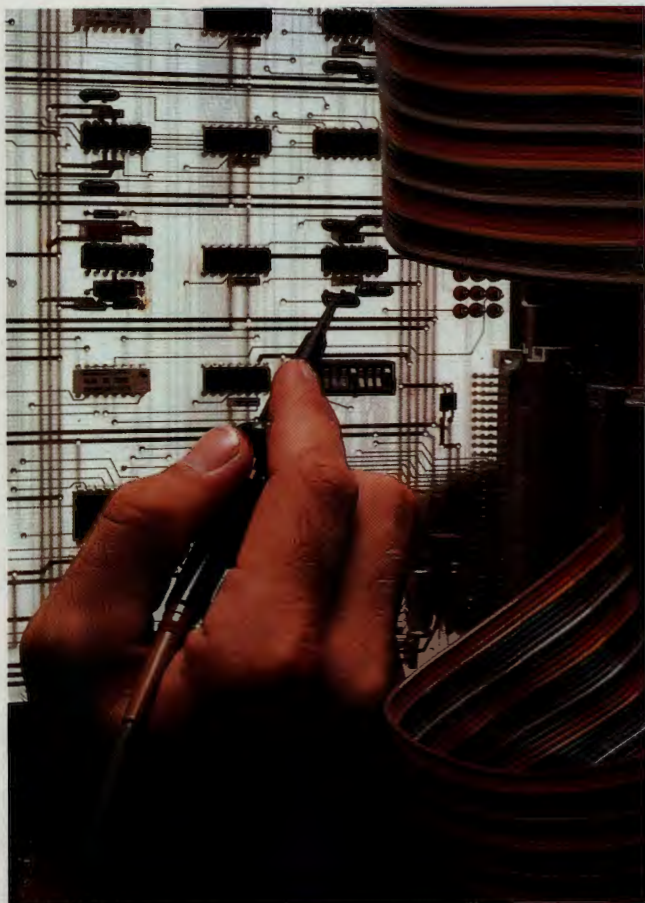
MICROFLITE's aircraft configuration range is versatile. The system is readily adaptable to the training of pilots and crewmembers in the operation of a wide range of aircraft types including single- and twin-engine piston and turbo-prop, single- and twin-engine jets and helicopters. MICROFLITE can easily address the training needs of light military aircraft users and can be configured to serve aviation training requirements in the light-to-intermediate transport/utility class as well.



COMPUTATIONAL SYSTEM

MICROFLITE's microprocessor-based computational system is the heart of the package and offers several very significant advantages over earlier training systems:

- **Very Large Scale Integrated (VLSI) Circuits** solve complex computations with a minimum of external connections and system components to give higher reliability and greatly reduced requirements for space and power.
- **Monoboard Computers** increase computational speeds thus facilitating real-time response.
- **Modular Expandability** permits the addition of substantial amounts of computing power in very small packages at very modest costs.
- **Distributed Processing** permits the use of dedicated systems for specific simulator functions such as flight, engines, and other aircraft systems, thus avoiding the need for the large, monolithic central computer systems used in traditional simulator design.



SUPPORT SERVICES

Link provides a full range of support services including documentation, training, spares, emergency spares, tools and test equipment, and field support.

Simulators are provided with maintenance manuals, drawings, and part lists to facilitate customer maintenance. Simple diagnostic, test, and calibration computer programs are included for quick fault isolation to the replaceable unit level. These maintenance aids, augmented by critical spare units, enable customers to maintain simulators without expert technicians.

Link's Support Services group, available at all times, provides any required technical assistance throughout the life of a simulator. This organization also provides routine and emergency assistance 24 hours a day, seven day a week. Services available include:

- **Free technical advice**
- **Temporary on-site technical support, as required**
- **Prompt filling of spare parts orders**
- **Expedited processing of emergency spare parts orders**
- **Design and installation of product improvements and modifications**

For further information, please contact Dept. 716

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THE SINGER COMPANY

MICROFLITE SERIES

QUESTIONS AND ANSWERS

1. **QUESTION** — Link has introduced a new series of microprocessor-based simulators with lower cost cited as one of the key features. What will the typical user pay for a MICROFLITE simulator?

ANSWER — See attached pricing chart below.

2. **QUESTION** — What will be the production and/or delivery time for a new MICROFLITE simulator?

ANSWER — A generic cockpit simulator will take approximately 10 to 12 months to manufacture. For a simulator where the cockpit represents a specific aircraft, we would expect the delivery time to be 15 to 18 months.

3. **QUESTION** — Where are the specific markets for this product world-wide?

ANSWER — The MICROFLITE line is specifically designed to support the training needs of light military aircraft operators around the world. Examples include the Swiss FFA Bravo, the Pilatus PC-7 and PC-9, the Australian A-20, the Aermacchi MB-339 and CASA 101. For non-military users, we are addressing the commuter operators and small commercial or utility aircraft owners worldwide. Examples include the Shorts 330 and 360, Dornier 228 and aircraft up to the complexity of the Saab Fairchild 340 and ATR-42.

4. **QUESTION** — Have any MICROFLITE systems been sold to date?

ANSWER — Yes, but we are not yet at liberty to disclose the customers. We have a number of proposals with potential buyers in review.

5. **QUESTION** — Are MICROFLITE simulators true simulators?

ANSWER — A configured MICROFLITE cockpit with motion and control loading is a true simulator. The extent to which the cockpit interior is made an exact replica of the aircraft is largely a matter of choice.

6. **QUESTION** — How does Link classify the level of simulation provided? For example, would the MICROFLITE series be capable of FAA Phase I certification? If not, where does it fall short of meeting that requirement?

ANSWER — The MICROFLITE series meets specific FAA training classification criteria. These can be found in FAA document 120-40C. There are three categories prior to a Phase I level certification. These are training device, non-visual, and visual. A MICROFLITE fixed-base simulator would meet the first level, i.e., a training device. A MICROFLITE simulator with motion and control loading would

meet the second level, i.e., non-visual training. A MICROFLITE with motion, hydraulic control loading, and visual would meet the third criteria, i.e., visual training. None of these levels, however, meet Phase I but there is no reason why the microprocessor-based technology involved in the MICROFLITE series could not, if the customer required it, be adapted to meet an FAA Phase I certification level. All that is required is the addition of modules to process the additional simulation data needed to achieve that level of certification. However, a customer requiring a level of training equal to FAA Phase I or better would probably be looking for a higher order of complexity simulator and would probably order a Link AST or comparable simulator. We already have proven simulator designs for aircraft such as the MD-80 and Boeing 737.

7. **QUESTION** — Please describe the low-cost visual system? Does Link produce it? Is it a real-time visual system?

ANSWER — The low-cost, real-time visual system being offered with MICROFLITE is not manufactured by Link. It is an off-the-shelf Silicon Graphics Iris system with an exclusive Link-modeled proprietary database. We feel that this is the most practical and cost-effective approach to providing a fully daylight visual for this series of trainer/simulators. However, if a customer wishes to invest in a more sophisticated visual system, MICROFLITE simulators will accommodate other Link visual products such as IMAGE II-T or IMAGE III-T. It should be noted that one of the reasons for selecting the Silicon Graphics Iris system is that it is a reliable, off-the-shelf, proven system that is easy to maintain and well-suited for Link's proprietary database modeling.

8. **QUESTION** — Does the MICROFLITE series for military application include a weapons training capability?

ANSWER — Yes, the MICROFLITE series is capable of providing basic weapons delivery training. Systems versatility with motion, control loading, and visual imagery is capable of providing excellent fundamental air-to-air and air-to-ground weapons delivery training... especially for mini-guns and rockets. Clearly, the MICROFLITE series is not designed to provide a high performance tactical fighter pilot with the sophisticated kind of air-to-air and air-to-ground combat simulation he requires for that complex type mission. Link can provide more sophisticated simulators for that kind of training. However, for fundamental weapons delivery training and weapons system familiarization, the MICROFLITE series can do an excellent job.

9. **QUESTION** — Are the microprocessor-based subsystems unique to the MICROFLITE line or are they also off-the-shelf equipment?

ANSWER — Several major subsystems for the MICROFLITE line are commercially available off-the-shelf. Link made this decision because the Division is determined to provide a reliable product with international availability for maintenance and service to assure accessible field support worldwide. Subsystems for the MICROFLITE line include Motorola and IBM components.

10. **QUESTION** — Is the MICROFLITE series going to replace the older GAT series in this segment of the market?

ANSWER — Yes, the GAT series — the GAT 1, 2, and 3 — has been retired. Advancing microprocessor-based technology has now made these training systems obsolete. We have specifically designed the MICROFLITE line to cover training requirements of aircraft users for whom the GAT line was created. MICROFLITE, with the aid of microprocessors, will enable us to offer even better simulation at very modest cost.

11. **QUESTION** — Who are your competitors, specifically, relative to this new line of products?

ANSWER — If the question relates to the microprocessor-based technology involved in the MICROFLITE series, Link is unique in the marketplace.

12. **QUESTION** — How can this microprocessor-based technology be applied to other simulation projects, i.e., simulation for the more complicated strategic and tactical military simulators or for the new generation large commercial simulators such as the 757/767... A300 series or MD-80.

ANSWER — Link is continually bringing new technology to the simulation marketplace. Further applications of microprocessors, in different technologies, for civil and military simulation requirements will be announced in the months ahead. Link's aim is always to be able to offer the best possible training equipment, no matter what the aircraft type. Microprocessors enable the Division to bring the many advantages of modern technology to this task, and offer even better simulation at modest cost.

TYPICAL PRICE RANGES — MICROFLITE SIMULATORS

Aircraft Type	Price Range for Generic Fixed Base to Motion/Visual Trainer	Typical Aircraft	Price with Custom Tailoring of Cockpit
Single-Engine Piston and Single-Engine Turbo	\$175K to \$500K	FFA AS 202 Bravo Valmet L-70 Siai Marchetti SF.260 EMB-312 Tucano Pilatus PC-7 and PC-9	\$500K to \$1.5M*
Twin Turbo	\$750K to \$1M	Shorts 330 and 360 Dornier 228 Beechcraft B200 and 1900 EMB-120 Brasilia Saab Fairchild 340	\$1.5M to \$3.0M*
Jet Trainer	\$250K to \$750K	CASA C.101 Aermacchi MB-339 Siai Marchetti S.211 Fairchild Republic T-46	\$1.0M to \$3.0M*

*Aircraft parts and data to be CFE or at additional cost (perhaps an additional \$500K to \$1M).